THE HALIFAX COPPER MINE.

Boston, August 18, 1862.

Carlos Pierce, Esq. — Dear Sir:

At your request, I went to Halifax, in Canada East, on the 11th instant, and made an examination of a copper mine situated in that township, one week having been spent in making this survey, including the journey. I have now the honor of reporting to you the observations which I made and the results obtained.

LOCALITY OF THE MINE.

This copper-bearing vein is situated in the township of Halifax, Canada East, in latitude 46° 10′ north and 71° 20′ east longitude from Greenwich.

It is sixty-five miles south, a little west, from Quebec, forty-five miles from Richmond, and fourteen miles south of Somerset Station by the road. In a direct line, it is only six miles east of the Grand Trunk Railroad to Quebec, and is not far from the Nicollet River, on which merchandise is transported in the winter months.

MINERALOGY AND GEOLOGY OF THE REGION EXPLORED.

All the rocks in the vicinity of the mine, and for a great distance around, consist of argillaceous slate, having a nacreous or pearly lustre like that of talcose slate. This rock is destitute of fossils, and appears to belong to the Taconic system of Emmons, or the lowest Silurian of Murchison.

The rock forms regular strata, which are highly inclined.

and dip to the north-west, at angles of from 45° to 60°, and their trend or course is north-east and south-west.

Numerous veins of white quartz, bearing bunches of chlorite, ilmenite, iron and copper pyrites, occur between the strata and are called imbedded veins. Some of these quartz veins are charged with considerable quantities of copper ores, in the forms of green carbonate, red oxide, ferruginous black oxide, copper pyrites, gray and purple copper ores;— the three first-mentioned copper ores having resulted from the decomposition of the copper pyrites, or yellow copper ore. Some brown spar, or carbonate of iron, also occurs with these ores in the quartz veins. Gold is found in small quantities in the Nicollet River, in detritus resulting from the disintegration of metalliferous quartz veins in this slate rock, and I was shown a sample of scale gold, washed out of the sand of that river by Mr. Hunter. Titaniferous iron, specular and magnetic iron ores, are also extensively disseminated through the nacreous slates, and are also found as black sand, with the native gold, in the streams.

Several copper mines have been opened in this region; one which is now extensively wrought by an English company in Leeds, and another, more recently opened, in Chester, have given valuable returns already, though they have been wrought for only a short time. The Leeds mine is 37 fathoms deep.

Indications of copper ores as manifested by patches of carbonate of copper and strings of copper pyrites abound in this geological formation, for many miles around Halifax. These indications have led to extensive "prospecting" or search for workable copper veins, the present discovery resulting from such explorations.

DESCRIPTION OF THE MINE.

The Halifax Copper Mine is situated in a rolling country, with hills of moderate elevation all around. It was discovered recently on a hill-side, near its summit, on the land of

Caleste Dubois, an outcrop or exposure of the vein being three feet wide where it appears above the soil. No excavations or blasting of the rocks was permitted by the owner of the mine, so I was obliged to content myself with such surface explorations as could be made without sinking upon the lode, tracing the outcrop along its course from one exposure to another, and measuring the dip of the vein, and computing its underground situation and the method of opening upon it.

At one point, near the road-side, some excavation had been made, and there the dip of the strata of rock and of the vein of copper-bearing quartz was ascertained. This point is 1070 feet distant in a N. E. course from the outcrop on the hill; and it is evident that the vein is continuous from one of these places to the other, though at the road-side the vein measures only eight inches in width on the surface, and widens somewhat as it descends into the rock.

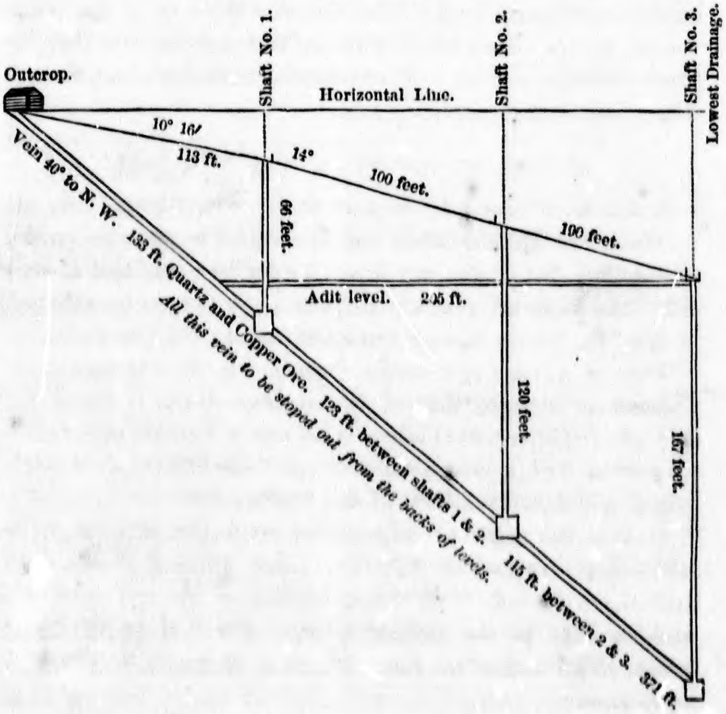
The dip of the strata of slate and of the vein is to the north-west and 40° from the horizon. The ores disclosed at this opening are, green carbonate, red oxide, ferruginous black oxide, gray sulphuret of copper, and yellow copper pyrites. They occur in the quartz vein, associated with brown spar, or carbonate of iron.

At the cob-house, on the hill, the vein is three feet wide, and is much richer in copper ores. Large quantities of carbonate of copper also exist in the soil, and in the decomposed parts of the vein. Gray copper ore is the principal and most valuable ore exposed at this place, and it occurs in such proportions as to render the vein valuable as a copper ore, masses of pure and solid ore, large as a man's fist, being readily obtained. This vein has been traced from point to point in a direction N. E. and S. W. from this place, about two and a half miles, one mile of which is on the lot now offered for sale. The lot consists of 100 acres, and is one-sixth of a mile wide.

From the outcrop on the hill, at the cob-house, I found the land to slope north-west to the fence 10° 16′; distance 113 feet. From thence to the lowest land the slope is

14° 1′; distance 190 feet. The vein dips to the north-west 40°, and hence is buried deep at the base of the hill, as shown by the accompanying diagram, which exhibits the lay of the land, the dip of the vein, and the method of opening upon it by shafts and an adit level. It is obvious that a large portion of the vein may be commanded by very simple mining operations, and if the ore proves as rich under ground as it is on the surface, it cannot fail to prove valuable, for a sheet of the vein a mile long, and probably two feet in average thickness, and of any depth opened, will be accessible to the miners who will sink a series of pits and drive levels on the lode, if the mine is wrought in the usual manner.

Diagram representing the situation of the vein and mode in which it should be opened by mining.


Outcrop.
Shaft No. 1.
Horizontal Line.
Shaft No. 2.
Shaft No. 3.
Lowest Drainage.
10° 16′
113 ft.
14°
100 feet.
190 feet.
66 feet.
Adit level.
245 ft.
120 feet.
167 feet.
Vein 40° to N. W. 133 ft. Quartz and Copper Ore.
All this vein to be stoped out from the backs of levels.
123 ft. between shafts 1 & 2.
115 ft. between 2 & 3. 371 ft.

Before sinking regular shafts, it will be proper to open the outcrop to sufficient depth to ascertain the exact dip, and also the value of the lode. This preliminary operation will furnish such information as will enable the miners to learn whether there is a probability or not that the mine will prove a paying one, and will decide the question as to working it on an extensive scale, or not to work it at all; for no man can now, from inspection of a mere outcrop, decide these questions with certainty. The question now is one of probabilities, and it is proper to state that the Leeds Copper Mine is in the same "country" or rock, in the same kind of gangue, and the ores are of the same kinds as those of the Halifax Mine; and I understand that the Leeds Mine is a permanent one, and is wrought profitably, the ore being sent to England. Its shafts are 37 fathoms deep, and there is an adit level 220 fathoms long. The Chester Mine is of the same nature, in the same kind of rocks and gangue, and thus far gives promise, as I am told, of being a profitable mine, though it has been but recently opened.

EXPENSE OF SENDING THE ORE TO MARKET.

It was ascertained, by inquiry of the "habitants," that the ore from the Halifax Mine can be hauled to Stanfold on the frozen Nicollet River in winter, for $5 per ton, and that it will then cost $6 per ton to take it to Boston by railroad, making the whole cost of transportation at $11 per ton.

This is a very reasonable freight for ore which may be dressed so high as that of the Halifax Mine, it being the rich gray copper ore chiefly. This ore will smelt easily with that from Acton, the latter holding a mixture of lime rock, which will flux the quartz of the Halifax ore.

It will be more economical to send the ore, properly cleaned, to Boston or New York, than smelt it on the spot, and there is less land transportation of the ore from the Halifax Mine to the railway than is required by the Leeds Mine. The latter requires 33 miles of hauling in wagons by horses.

BUILDINGS ON THE LAND.

The woods have been cleared off and the stumps removed from the chief part of the land, and two small houses and two barns are now upon it, and these, it is understood, are to be sold with the mine.

LABOR FOR MINING AND OTHER WORK

may be had at unusually low rates, the French people in the county all around seeking such employment, and working at low wages.

A few regularly educated miners will be required, of course, but the chief labor will be performed by the French "habitants," who become, under instruction, good miners.

WATER FOR DRESSING THE ORE.

A never-failing stream of water passes close to the mine, and will furnish all the water required, both for steam engines and washing machinery. It may also, by means of a dam, be made to give adequate water-power for driving stamps or for crushing the ore.

This water-power, I understand, will belong to the property, and adds to its value, since it aids in an important way in concentrating the ores, by furnishing adequate power and an abundance of water for that purpose.

ANALYSIS OF THE HALIFAX GRAY COPPER ORE.

A sample of the gray ore, picked as clean from the rock as possible, yielded on chemical analysis of 100 grains, —

Metallic copper	57.0
Silicious matter	6.6
Sulphur and iron	36.4
	100.0

Black oxide of copper, according to authorities, yields, per cent., —

Copper	79.86
Oxygen	20.13
	100.00

Pure red or sub-oxide of copper contains, per cent., —

Copper	88.88
Oxygen	11.12
	100.00

Copper pyrites contains 34 per cent. of copper, and the green carbonate 55 per cent. In dressing the ores, by water, only the gray copper ore, copper pyrites, and perhaps some of the red oxide, can be saved.

The value of a ton of copper ore is ascertained, at the price now paid, by multiplying the percentage yield by four dollars; hence, in estimating the value of the gray ore, as analyzed, we have 57 × 4 = $228 as its market value. It should, however, be observed, that it will not be economical to dress the ore so high, on account of the loss of the portions which will adhere to the gangue, and that it is not desirable to raise it higher than 20 per cent., which will be a sufficiently rich and marketable ore.

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State Assayer.